IJASD
ISSN:2618-1193

Advancements in Irrigation System in District Charsadda Through Latest Technique

Anam Munawar[1]*, Namra Ghaffar[2], Hafsah Batool[3]
[1*2]Department of Space Science, University of the Punjab, Lahore.
[3]Department of Geography, government. F C. College(AChartered University, Gulberg, Lahore.
* AnamMunwar Email: anam_munawar12@yahoo.co

Citation | Anam Munawar, Namra Ghaffar, and Hafsah Batool, "Advancements in Irrigation System in District Charsadda Through Latest Technique", IJASD, vol. 4, no. 1, pp. 9–13, Feb. 2022.
Received | Jan 18,2022 **Revised |** Feb 19,2022**Accepted |** Feb 24,2022;**Published |** Feb 27,2022.

More than half of Khyber Pakhtunkhwa's agricultural land is irrigated, while the other half relies on rainwater for irrigation, making it one of the aridest regions in Pakistan. Agriculture, especially in rain-fed regions, relies on effective water management to ensure its long-term sustainability. This research was conducted in Charsada KPK and an effort was made for utilization of available water efficiently. In this regard it was found that the land dependent upon rainy water reduced with passage of time due to enhancing the distributries throughout the region that lead to enhanced production and finally a healthy contribution in regional economy.

Keywords; Rainfed areas, Water distribution, Arid region, Irrigated land.

Introduction:

Agricultural irrigation has become a vital part of the industry because crops cannot thrive without it. Approximately 40% of the world's food supply is grown using irrigation water, covering 20% of all farmed areas[1][2][3]. Sub-Saharan Africa (SSA) has just 4 percent irrigated agricultural area, compared to 41 percent in Asia, ten times as much as SSA [4]. The green revolution in Asia would not have been possible without irrigation and better inputs and mechanization [5][6]. Agriculture's output must be increased due to the rapid growth of the world's population. About 90% of the production improvement must come from already-cultivated land, and just 10% from plowing the additional ground[4]. Agriculture can be both irrigated and rain-fed, although irrigated agriculture provides the greatest potential for agricultural intensification [7][8]. Agriculture and the economic well-being of a region are both boosted by irrigation [9]. A wide range of studies on irrigation and its impact on agricultural productivity and the well-being of farmers are currently available, although they are highly polarised. The government's irrigation spending has a negligible impact on agricultural yield (2000)[10][11]. Improvements in irrigation did not lead to an increase in agricultural productivity, according to a study (2002)[12][13]. Drought has been shown to have a positive impact on agricultural productivity and the livelihoods of various African populations by numerous academic researchers [14]–[23]. It is possible to adjust agricultural production and timing with a year-round supply of irrigation water [22], [24].

About 54.7 million acres of cultivated land area in Pakistan, with 41.9 million acres irrigated and 12.4 million acres dependent on rainfall for crop production. Canal irrigation is feasible on 4.4 million of the 12.7 million acres of rain-fed irrigated land [25][26]. at 14.4 million acres of Khyber Pakhtunkhwa, just 28.91 percent are farmed, with the remaining 69.91 percent being uncultivated. Irrigated land covers just over half of the total cultivated area, leaving 20 million acres with no water for agriculture totally on rainfall[27][28]. It's impossible to predict when and how much rain will fall, so farmers use the bare minimum to avoid crop failure, which causes widespread food shortages. Increasing yield per hectare or plowing additional land can boost agricultural production in rain-fed areas [29]. Water appears to be the most important element [30][26]. As a result, the province has a per capita water supply of approximately 499 m^3, which is less than the national average of 1150 m^3 and the international average of 980 m^3.

According to government estimates, crop intensification will reach 130% by 2018[31][32]. However, only a very limited assessment of the dam's impact on the irrigation system of the command area has been carried out.

Areas of study

The study's goals necessitated the collection of revenue data from two localities.

Materials and Procedures

Khyber Pakhtunkhwa is one of Pakistan's most dry regions, with more than half of its agricultural land irrigated and the other half on rainwater for irrigation. In agriculture, especially in rain-fed areas, long-term viability hinges on efficient water management. irrigation systems of Charsada will be evaluated as part of this research. The ArcGIS 10.1 program is used for the geographic analysis of the data. According to researchers, canal irrigation has expanded dramatically. Today, the irrigation canal irrigates 54 percent of the farmland which had never contemplated canal irrigation. After the dam was built, the area watered by tube wells decreased from 74 percent to 25 percent of the total irrigated area. Data was collected from local irrigation offices. The data was coordinate based we applied the Inverse distance weight interpolation technique to calculate the unknown values on the basis of known values. The data was available with irrigation patwari.

Analysis

Using ArcGIS 10.5.2, we analyzed the data we collected.

Results

The findings of this research show that initially most of the study site was rain-fed due to the non-availability of an irrigation system but with the passage of time and due to the construction of the dam, a sufficient amount of water become available, and dependency upon rainfed reduced.

Study Site

Ideal for year-round farming due to its mild climate. The soil in the research area is rich in nutrients and suitable for many crops, but irrigation water shortages have left much of the farmland to fallow.

Irrigation procedure

A lack of water and a lack of rainfall can negatively influence agricultural yields in areas where rain-fed irrigation is the primary method of water supply. As a result, the study site is dependent on rain-fed irrigation rainfall is sporadic and unpredictable. Many crops fail because of a lack of rain in both the Kharif and Rabbi seasons. Since the dam was erected, canal irrigation has taken over as the principal water supply method. On the other hand, the canal irrigation system depends on the village's location along the canal and the land's location along the watercourse for water supply. It receives far more water than a community located at its tail end, which receives very little water. There is enough water for crops and livestock in areas close to branch canals and distributaries.

Canal irrigation quickly displaces rain-fed irrigation, which was the norm prior to dam construction. According to a field assessment, water in the canal is highly variable, increasing and falling. Because of the irregular supply of water, the neighborhood was forced to build a reliable water distribution system. The water distribution system is one such example. It's called a "warbands" irrigation system because it divides the watercourse's flow among several farms, each of which receives it for a set period of time every seven days.

The words "wara" and "bandi," which together form the phrase "warabandi," signify "turn" and "fixed," respectively. Both villages practice Pacca warabandi. paccawarabandi, as opposed to kaccha warabandi, is officially recognized and scheduled by the irrigation department, whereas kaccha warabandi is determined unilaterally by farmers on mutual consent. This cycle can take as long as ten and a half days during water scarcity, which is unusual. Despite this, there is the occasional informal interchange of water between farmers, particularly among farmers whose warabandi turns fall within a short period of time. In tubewell irrigation, it's common for farmers to sell water turns in tubewell irrigation. To resolve a water dispute, the Divisional Officer calls a shareholders meeting and uses the landholding's position in the rotation registry to determine how long it will take and how many turns it will take. In the Warabandi system, food crops come first, followed by fodders.

Conclusions

According to a review of collected tax records, the Charsada had a significant impact on a small number of nearby towns. However, because the study site is a much larger area therefore its effects are more obvious than those of the smaller communities. Before the construction of the dam, the study site relied on tube wells and rain-fed irrigation. The dam changed that, and now canal irrigation is the primary method of watering most of the land. As a result, the farming practices of the selected communities were substantially altered. As a result of the abundance of water, the regular cropping pattern was altered. Agriculture has been increasingly commercialized due to the arrival of sugarcane in Kharif and onions in Rabi. According to the research, Khyber Pakhtunkhwa should build tinier. Efficient water management is essential for agricultural growth because of the limited irrigation water

supply. Therefore, it is critical to use irrigation water wisely. According to the current data, the area near the canal's head has more water than the land near the canal's tail. It is possible to increase irrigation area and, consequently crop yields.

References

[1] M. A. Hamna Butt, Sadia Sheikh , Hafsah Batool, "Sowing Dates Effect on Production of High Yielding Maize Varieties," Int. J. Agric. Sustain. Dev., vol. 3, no. 4, pp. 116–124, 2021.

[2] G. E. Petts and A. M. Gurnell, "Dams and geomorphology : Research progress and future directions," vol. 71, pp. 27–47, 2005, doi: 10.1016/j.geomorph.2004.02.015.

[3] J. A. Burney, R. L. Naylor, and S. L. Postel, "The case for distributed irrigation as a development priority in sub-Saharan Africa," Proc. Natl. Acad. Sci. U. S. A., vol. 110, no. 31, pp. 12513–12517, Jul. 2013, doi: 10.1073/PNAS.1203597110/ASSET/494CAB11-0AA1-4FC2-B6D9-0109DC624471/ASSETS/GRAPHIC/PNAS.1203597110FIG02.JPEG.

[4] Y. Gao et al., "Impacts of river impoundment on the riverine water chemistry composition and their response to chemical weathering rate," 2013, doi: 10.1007/s11707-013-0366-y.

[5] T. Torgersen, B. Branco, and J. Bean, "Chemical Retention Processes in Ponds," vol. 21, no. 2, 2004.

[6] P. B. R. Hazell, "The Asian green revolution," Food Secur. Vol. Two – Prod. enough food, Part One – Sources Agric. growth, no. November 2009, 2014, [Online]. Available: http://ifpri.worldcat.org/title/food-security/oclc/871340599%5Cnhttp://ebrary.ifpri.org/cdm/ref/collection/p15738coll5/id/4748

[7] J. A. Harrison et al., "The regional and global significance of nitrogen removal in lakes and reservoirs," pp. 143–157, 2009, doi: 10.1007/s10533-008-9272-x.

[8] F. T. Portmann, S. Siebert, and P. Döll, "MIRCA2000—Global monthly irrigated and rainfed crop areas around the year 2000: A new high-resolution data set for agricultural and hydrological modeling," Global Biogeochem. Cycles, vol. 24, no. 1, p. n/a-n/a, Mar. 2010, doi: 10.1029/2008GB003435.

[9] H. B. Rubeena Asghar, Sabeela Asghar, "Pakistani Basmati Competitiveness in International Markets and its Macroeconomic Factors," Int. J. Agric. Sustain. Dev., vol. 3, no. 4, pp. 111–115, 2021.

[10] S. A. Brandt, "Classification of geomorphological effects downstream of dams," pp. 375–401, 2000.

[11] B. Schultz, C. D. Thatte, and V. K. Labhsetwar, "Irrigation and drainage. Main contributors to global food production," Irrig. Drain., vol. 54, no. 3, pp. 263–278, Jul. 2005, doi: 10.1002/IRD.170.

[12] G. Verstraeten, J. Poesen, G. Verstraeten, and J. Poesen, Progress in Physical Geography assessment of sediment yield Estimating trap efficiency of small reservoirs and ponds : methods and sediment yield. 2000. doi: 10.1177/030913330002400204.

[13] S. Fan, L. Zhang, and X. Zhang, "Growth, inequality, and poverty in rural China: The role of public investments," Res. Rep. Int. Food Policy Res. Inst., no. 125, pp. 1–72, 2002, doi: 10.2499/0896291286rr125.

[14] S. Jin, J. Huang, R. Hu, and S. Rozelle, "The Creation and Spread of Technology and Total Factor Productivity in China's Agriculture," Am. J. Agric. Econ., vol. 84, no. 4, pp. 916–930, Nov. 2002, doi: 10.1111/1467-8276.00043.

[15] B. M. Mali, "Capacity development for smallholder irrigation in Kenya," Irrig. Drain., vol. 57, no. 3, pp. 332–340, Jul. 2008, doi: 10.1002/IRD.437.

[16] D. Bacha, R. Namara, A. Bogale, and A. Tesfaye, "Impact of small-scale irrigation on household poverty: empirical evidence from the Ambo district in Ethiopia," Irrig. Drain., vol. 60, no. 1, pp. 1–10, Feb. 2011, doi: 10.1002/IRD.550.

[17] F. Hagos, G. Jayasinghe, S. B. Awulachew, M. Loulseged, and A. D. Yilma, "Agricultural water management and poverty in Ethiopia," Agric. Econ., vol. 43, no. SUPPL. 1, pp. 99–111, Nov. 2012, doi: 10.1111/J.1574-0862.2012.00623.X.

[18] R. E. Namara, G. Gebregziabher, M. Giordano, and C. De Fraiture, "Small pumps and poor farmers in Sub-Saharan Africa: an assessment of current extent of use and poverty

outreach," http://dx.doi.org/10.1080/02508060.2014.847777, vol. 38, no. 6, pp. 827–839, Oct. 2013, doi: 10.1080/02508060.2014.847777.

[19] T. Shah, S. Verma, and P. Pavelic, "Understanding smallholder irrigation in Sub-Saharan Africa: results of a sample survey from nine countries," http://dx.doi.org/10.1080/02508060.2013.843843, vol. 38, no. 6, pp. 809–826, Oct. 2013, doi: 10.1080/02508060.2013.843843.

[20] T. Amede, "Technical and institutional attributes constraining the performance of small-scale irrigation in Ethiopia," Water Resour. Rural Dev., vol. 6, pp. 78–91, Nov. 2015, doi: 10.1016/J.WRR.2014.10.005.

[21] T. Tolera, B. Legesse, M. Aman, and T. Etensa, "Economic Valuation of Improved Irrigation Water Use : The Case of Woliso Economic Valuation of Improved Irrigation Water Use : The Case of Woliso District , South West Shoa Zone , Oromia National Regional State , Ethiopia," J. Econ. Sustain. Dev., vol. 8, no. 13, pp. 58–64, 2017.

[22] G. Ayala, B. Muleta, and T. Geremu, "Assessment of Status of Irrigation Practice and Utilization in Western Hararghe Zone, Oromia, Ethiopia," Civ. Environ. Res., vol. 10, no. 5, pp. 1–13, 2018.

[23] S. Lata, "Impact of irrigation on agricultural development: A correlative analysis," Adv. Asian Human-Environmental Res., pp. 315–347, 2019, doi: 10.1007/978-3-030-00952-6_7/COVER.

[24] M. Ashraf, M. A. Kahlown, and A. Ashfaq, "Impact of small dams on agriculture and groundwater development: A case study from Pakistan," Agric. Water Manag., vol. 92, no. 1–2, pp. 90–98, Aug. 2007, doi: 10.1016/J.AGWAT.2007.05.007.

[25] A. S. Brainard and G. W. Fairchild, "Sediment characteristics and accumulation rates in constructed ponds," vol. 67, no. 5, pp. 425–432, 2012, doi: 10.2489/jswc.67.5.425.

[26] "Development statistics of Khyber Pakhtunkhwa," Bureau of Statistics, Planning and Development., 2016.

[27] W. H. Nowlin, J. L. Evarts, and M. J. Vanni, "Release rates and potential fates of nitrogen and phosphorus from sediments in a eutrophic reservoir," pp. 301–322, 2005, doi: 10.1111/j.1365-2427.2004.01316.x.

[28] GoKP, "Palai Dam project, feasibility report. Irrigation department, small Dams directorate, Peshawar," 1994.

[29] S. H. Anila Arif, Kashif Shafique, Khuram Ahmad Khan, "Policy Analytics-Insights from Pakistan and India Water Policies," Int. J. Agric. Sustain. Dev., vol. 3, no. 4, pp. 103–110, 2021.

[30] K. Karlsson, M. Viklander, L. Scholes, and M. Revitt, "Heavy metal concentrations and toxicity in water and sediment from stormwater ponds and sedimentation tanks," J. Hazard. Mater., vol. 178, no. 1–3, pp. 612–618, 2010, doi: 10.1016/j.jhazmat.2010.01.129.

[31] W. F. Smith-vaniz, "Rotenone : An Essential but Demonized Tool for Assessing Marine Fish Diversity," vol. 58, no. 2, pp. 165–170, 2008.

[32] M. J. Nasir, A. S. Khan, S. Alam, and S. Akhtar, "Impacts of Palai Dam on Land use and Cropping Pattern of Mouza Qilla, District Charsadda, Khyber Pakhtunkhwa, Pakistan," Sarhad J. Agric., vol. 33, no. 1, pp. 80–89, Mar. 2017, doi: 10.17582/JOURNAL.SJA/2017.33.1.80.89.